Bodies in Motion: The Pas de Deux of the Ideal and the Material at the Fin-de-Siècle

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Seizing the Instant in an Image, Capturing Movement through Repetition

> *Even if one has a general knowledge of the way people walk, one knows nothing of a person's posture during the fractional second of a stride... The camera introduces us to unconscious optics as does psychoanalysis to unconscious impulses.*
>
> WALTER BENJAMIN, *The Work of Art in the Age of Mechanical Reproduction*[1]

At the turn of the last century, the arts, the sciences, technology and mass entertainment formed a complex nexus centered on the representation of the body in motion. The motion studies of Eadweard Muybridge and Etienne-Jules Marey occupy one of the principle switching points in this nexus, shunting us alternately onto the pathways of physiology, modern art, instantaneous photography or the cinema. This complex site of transfers need not be read in terms of cause and effect, nor as a necessary progression. Marcel Duchamp's *Nude Descending a Staircase* is not simply a logical outcome of the chronophotographs of Étienne-Jules Marey, nor is Eadweard Muybridge necessarily the father of motion pictures. Instead, projects of motion analysis, their technologies and the knowledge and amusement they produced, form a locus of points, a figure of multi-directional intersections resembling the interlaced strands of an Art nouveau design. Only a figure of such elegance and complexity could

describe the dynamic relation between body and motion, knowledge and representation that came into focus as the nineteenth century came to an end and a new century took shape.

The invention of instantaneous photography provides a point of entry for this intersection. The original goal of the invention of photography in the researches, experiments and achievements of Wedgwood, Niépce and Daguerre in the early part of the nineteenth century expressed a traditional desire to overcome time the destroyer, that which causes natural things to wear away, decay and fade.[2] The innovation of photography that appeared in 1839 (the year Fox Talbot's independent experiments and the success of Daguerre's adaptation of Niépce's process were officially recognized) consisted primarily of "fixing" the camera obscura's transient images and stopping the photochemical changes that had caused Wedgwood's earlier silver nitrate images to fade to black. Photography sought to preserve what Talbot described as "fairy pictures, creations of the moment and destined as rapidly to fade away."[3] Fixing the momentary image of the camera obscura or the reflection caught by the picturesque Claude glass, making the photochemical image, which seemed destined to fade, permanent – these ambitions recall traditional idealist aesthetics: art as defense against transience and decay, wresting the eternity of the ideal from the inevitably decadence of the real.

However, as Michel Frizot states in his new history of photography, "The recording of *movement* was not a particular aspiration of the nineteenth century photographer."[4] The long exposure times required for the early photographs during most of photography's first four decades (1839-1879) – ranging from hours to several minutes at the beginning of this period and still lasting several seconds towards the end (with a few experiments cutting it short in the late 1870s) – practically forbid the representation of objects or people in motion without blurring the image. As reports on Daguerre's first photographs noted, "Nature in motion cannot be represented... In one of the views of the boulevard... all that was walking or moving does not appear in the picture."[5] New means of treating the photographic plate that appeared commercially in the 1880s allowed an exposure time of a fraction of a second.

This innovation heralded a second photographic revolution – nearly a new invention – which altered the look and use of photography, as well as photography's relation to the familiar world.

In the 1880s the new dry plate technology transformed the photographic industry, including the Société Lumière, the photographic supply company based in Lyon founded in 1882 by *pater familias* Antoine, and his two sons Louis and Auguste. While still a teenager, Louis Lumière devised a formula for a dry plate process that was economical and extremely sensitive to light. The gelatin-bromide plate that the company introduced,

known as the *Etiquette Bleue Extra Rapide*, greatly reduced exposure time, allowing skillful photographers to freeze motion in full flight. By 1889 demand transformed the Lumière company from an artisanal concern (in which Louis and his brothers and sister initially labored for 16 hours a day coating plates with the new emulsion) to a firm which employed over a hundred male and female workers (the "stars" of the first Lumière film, *Workers Leaving a Factory*) producing over a 15,000 plates a day.[6]

A wide range of photographers strove to achieve the latest and greatest of photographic novelties, the seizing of an instant, the suspending of time in its courses. Talbot, Niépce and Daguerre hoped to have nature imprint herself, to provide spontaneously an image already familiar, not so much from natural perception as from the various picturesque visual devices of the early nineteenth century, such as the camera obscura or the Claude glass. But the snap shot, the instantaneous photograph, opened onto a world no one had seen before, a visually unfamiliar and even absurd world of suspended people and objects. Instantaneous photographs revealed things no eye had seen, no human being had experienced, representing positions of limbs that were unfamiliar, postures that seemed ungainly, facial expressions which resembled exaggerated grimaces. An early aesthetician of photography cautioned amateurs against these effects, declaring: "For the most part the positions of men and animals, captured as one might say on the wing, have nothing attractive about them... they look all the more ungracious because our eyes, which perceive things relatively slowly, are not used to capturing them thus."[7] It was precisely the gap between pretty pictures and the recording of the trajectories of matter in motion that attracted the attention of scientists like Marey to the new form of photography, realizing the temporal precision of instantaneous exposures transformed the camera into a tool of measurement of actions not previously visible. The scientific analysis of motion through photography could be founded on a rigorous basis.

To advertise and demonstrate their wares the Lumière family became photographers of the instant in the late 1880s as they would become motion picture cameramen in the 1890s. The 15 February 1888 issue of *L'Amateur Photographe* reprinted (by means of an engraving) two instantaneous photographs sent in by Antoine Lumière, one of a man kicking his leg upwards as he leaps towards another man standing near by, and the other of a man in mid-air leaping, about to land next to a sleeping dog.[8] The 1st February 1887 issue of *L'Amateur Photographe* published another instantaneous photo from a "M. Lumière" portraying Auguste Lumière caught in the act of leaping over a kitchen chair in a brightly lit courtyard, beaming in delight at the camera.[9] These and other instantaneous images capture the Lumières' fascination with representing mo-

tion even before Papa Antoine saw an Edison Kinetoscope in 1894 and the Cinématographe was conceived. The Cinématographe derives as directly from instantaneous photography as it does from Edison's invention. A report on one of the earliest Cinématographe projections in the *Bulletin du Photo Club de Paris*, described the new invention as "a curious application of instantaneous photography."[10] The increased sensitivity of Louis' emulsion made the registering of motion by the Cinématographe possible (the film stock used in the machines was coated with the same emulsion used in the *Etiquette Bleue* plates).[11] The Lumières completed the circuit from the technology of instantaneous photography to a new form of mass entertainment, as Muybridge and Marey forged the link between instantaneous photography and scientific observation.

But if we return to our nexus, instantaneous photography intersects with the fine arts as well as the emerging popular entertainment of motion pictures. The intersection between painting and the new photography in the reception of Muybridge's images of the horse in motion by equestrian painters demonstrated the desire by turn-of-the-century painters (both academic and progressive, Meissonier and Degas) to get it right, to think of their images as scientifically grounded, reflecting a frozen instant. Outside the trajectory of realism another encounter with the portrayal of motion appears in the painting of the Symbolists and the craftsmen of Art nouveau, an encounter whose relation with instantaneous photography may be less direct, but which also revolutionized the representation of the body in motion and prepared the way to entirely new models of representation in the first decades of the twentieth century.

If the relation between instantaneous photography and the history of painting begins with the photographs of Muybridge serving as a tutor to painters with realist ambitions in the 1880s, it came full circle in the second decade of the twentieth century with Marcel Duchamp's *Nude Descending a Staircase*. While Duchamp acknowledged the influence of Marey and chronophotography on the painting, his avowed desire to portray motion led to him to "break the chains of naturalism forever."[12] Certainly, the formal visual differences between the sharply defined forms of Muybridge and the often nearly transparent phantoms of Marey partly explains the different appearance of academic equestrian paintings of the 1880s and Dadaist abstractions in 1912. But how to explain the fascination exerted by these new photographic images of motion, the dissolving of the body in the vectors of its propulsion, for modern artists who were not scientists? Tracing transformations in the portrayal of physical motion and the body in painting in the years between 1880 and 1912 returns us to our figure of interlaced intersections, in which cause and effect give way to mutual contamination and re-definition.

Let me juxtapose, then, Duchamp's 1912 dissolving of form in motion with a painting from the beginning of our period, Edward Burne-Jones' *The Golden Stair* from 1880. Although this image represents a full troop of individual female musicians descending a stair, the harmonic interaction of their respective bodily positions creates such a harmonized effect that it is hard not to see them as successive stages of a single action. Reportedly Burne-Jones used several models for the faces (although the physiognomy of all of Burne-Jones' women looks the same to me), but a single model in successive poses was used for the body, which, explains what Russell Ash calls, "the chorus line equality of their proportions."[13] This pattern of rhythmic repetition, a Pre-Raphaelite version of Kracauer's Tiller Girls, gives this deliberately archaic image a modern effect. Although the individual bodies are sharply defined, the downward sweep of the procession, from step to step and posture to posture, creates an impression of the stages of metamorphosis of a single moving body, especially if we follow the succession of the line of limbs in a steady rhythm of flexation. If we pinned on these women the white strip Marey stitched to his models to aid the graphing of key movements, the resulting patterns would compose the rhythmic flow of motion such graphs portray subordinating the individual bodies to an overwhelming rhythm or movement and repetition. The flow of the pleats of the women's dresses almost plays this role, even though the studies Burne-Jones made of his model as she descended the staircase were, in fact, of her in the nude. In spite of their being taken from different models, the double helix of women's faces also seem to capture separate stages of a single motion, particularly in sets of three, as heads pivot almost seamlessly on necks and gazes make a circuit of the space, until at the point of exit, to quote Belgian Symbolist Fernand Khnopff's description of this painting, "the last of the maidens stops, and turning her head once more, sheds a smile of farewell."[14] The rhythm of this motion moves from head to toe, with the succession of feet and toes causing Burne-Jones to complain, "I have drawn so many toes lately that when I shut my eyes I see a perfect shower of them."[15] I will resist deriving a Kittler-like anticipation of the visual after-image of the cinematic illusion from this statement. Clearly Burne-Jones operates within a long tradition of rhythmic portrayals of groups that date from at least Tintoretto, the sorts of images that Sergei Eisenstein would celebrate as anticipations of cinema.[16] Burne-Jones most likely created his images without the direct influence of Marey or Muybridge, since photographic studies of the figure in motion had just begun. Besides, the intentions of the chronophotographers and this late Romantic painter contrast sharply. Rather than attempting to chart the flow of physical bodies with a modern precision technology, Burne-Jones sought to resurrect a distant era and convey an archaic spirituality. But the visual

convergence of this artistic and spiritual project at the end of the nineteenth century with a scientific project from about the same time involves more than formal coincidence.

This is even clearer if we look at *Memories*, an 1889 painting by Burne-Jones's Belgian admirer Khnopff. Here again we find a succession of female figures whose repetitive physical similarities, strongly posed positions and manipulation of a single object, the badminton racquet, creates a chronophotography-like image seemingly composed of separate stages of a single motion. The rhythm of staggered motion and repetition begins with the three figures on the left, stacked in superimposition, evokes a pivoting of the head, that in turn, cues a circular transit around the figure, as if the viewpoint as much as the figure were in motion (recalling Muybridge's images in which a figure was photographed from within a semi-circular battery of cameras to create a 360 degree view). The slightly later date of Khnopff's *Memories* makes a direct influence from Marey and/or Muybridge more possible, but if chronophotography did not play a role in the painting's creation, still photography certainly did. Khnopff used photographs of successive poses of his beloved sister Marguerite to create the painting.[17] The use of photography as an aid to composition is hardly unusual for this period, but Khnopff, like Burne-Jones (and possibly from similar Symbolist motivations), emphasizes rather than conceals the effect of repetition and mechanical reproduction, gaining from it a dream-like and hallucinatory evocation. As Emile Verhaeven said in his essay on his fellow Belgian, "In symbolism fact and world become mere pretext for ideas; they are handled as appearances, ceaselessly variable and ultimately manifest themselves only as the dreams of our brains."[18] The title of the painting, *Memories*, psychologizes this physical repetition, as if the successive images might be Proustian specters of the self multiplied in recall.

Paintings of the Symbolist school at the turn of the century nearly swarm with similar modular compositions that present variations of figures so similar one gets the impression of the rhythmic articulation of a single action. The paintings of Swiss Symbolist Ferdinand Hodler in the 1890s includes many such groups in which similarity of drapery and the symmetry of posture and gesture create a rhythmic flow from repetitive figure to repetitive figure. The title of one such painting, *Eurythmy* from 1895, reveals Hodler's inspiration in the spiritual discipline of the body introduced at the turn of the century by theosophical and anthroposophical groups. The Symbolists strove to portray a world suffused by a common rhythm which travels through diverse bodies and through nature itself. Although such spiritually inspired imagery remains at antipodes with the purposes behind Marey's physiology, the spiritually-minded drew from Marey's photographs less a scientific record of the patterns of physical

matter in motion than an image of rhythm and motion which rendered bodies transparent, specter-like, yet transmitting a powerful aura. Starting from opposed intentions, the images of motion converge in similar visual schema.

Motion Sickness: The Disease of the Ideal Body

Inconscient, descendez en nous par réflexes;
Brouillez les cartes, les dictionnaires, les sexes.
Tournons d'abord sur nous-même, comme un fakir!
(Agiter le pauvre être, avant de s'en servir.)

Jules Laforgue, *Complainte de Lord Pierrot*, 1884

But the ungraceful positions of instantaneous photography would seem to operate in an opposite direction to the idealism of Symbolism, towards a de-romanticization of the body, capturing its far-from-ideal awkwardness. In contrast to the symmetry of the rocking horse-like images of galloping horses in earlier equestrian painters, Muybridge revealed a horse's legs crumpled together in wad beneath its belly, resembling a crushed spider. This ungainly quality would be seized upon by a realist like Degas to create sculpture which seem to be toppling over, unsteady, overcome by the material force of weight and gravity. But, almost paradoxically, this very surrender to the impetus of falling or leaping, the physical tension of maintaining or losing balance itself, inspired Auguste Rodin to portray the agonistic aspect of spiritual struggle, bodies out of control, endowed with a spastic energy which twisted them into grotesque postures. For Rodin, claiming "the body always expresses the spirit of which it is the envelope,"[19] such figures embodied the idealist struggle, or *agon* of spirits in travail.

The tortured physicality of this fin-de-siècle idealism thus converges with the visual representation of which it would seem ideologically opposed: science and new technology. The body that expresses the spirit for Rodin, is a Naturalist body composed of taut muscle and stretched nerves. Perhaps nowhere is this clearer than in Rodin's 1892 monument to Claude Lorrain, the eighteenth century landscape painter whose pictures inspired the vogue for the "Claude" glasses that bore his name. Deborah L. Silverman describes Rodin's sculpture of the painter in these terms: "The state of inspiration found its physical embodiment in torsion, in the awkward bending and swerving of the legs, in taut immobility."[20] We recognize here the lack of grace found in instantaneous photographs (which may or may not have served as inspiration), and

Silverman's phrase "taut immobility," recalls the interrupted and fixed instant of photography, in which the immobility offers no repose, but rather a simultaneous preparation for, and resistance to, movement's next phase.

Controversy surrounded the unveiling of this monument in 1889. Both its defense by modern artists associated with the Symbolists or Art nouveau and its execration by more traditionally-minded critics, reveals the heated ideological conflicts surrounding the modern representation of the body in motion. Instead of Claude's awkward off-balance posture, critics felt Rodin should have chosen "from Nature harmonious, simple and beautiful poses, like those unsurpassed models offered us by antique sculpture."[21] But Art nouveau sculptor and painter Victor Prouvé defended Rodin's exact portrayal of physical movement in terms that recall the precision of chronophotography: "For him the reproduction of a gesture or a form should not be the result of a servile whim or a petrified model, but should spring from the sensation of displacement in movement. The shriveled muscles swell and ripple and the observing eye follows the shuddering flesh from its energized contractions and tautness to its ample smooth and still slackness."[22] The extraordinary Art nouveau glass artist Emile Gallé found Rodin's conception particularly appropriate for Claude whom he described as, "the stenographer of the transient things unfolding between earth and heaven."[23] For Gallé the physical tension embodied in Claude's posture expressed the conflict created by "the mind's daring range as it pushes a timid body toward the conquest of the radiant ideal."[24] In the turn-of-the-century art movement that, let us recall, was as often referred to as Decadent as it was called Symbolist, the pursuit of the ideal affects the body like a disease.

Thus the harmony of Symbolist figures repeating their rhythmic postures in slight variations expresses not only the ideal, but its difficulty in finding embodiment in the flesh. While this is clearer in the contorted figures of Rodin than in the ethereal, idealized figures of Burne-Jones or Khnopff, the terms of defense Gallé and Prouvé offered Rodin reveal the affinity between the graceful representation of motion which characterizes Art nouveau and the taut torsion of the diseased or suffering body. The pure force of motion represented in the liquid forms of Gallé or in the flowing force of Prouvé's sculpture harbor something of the threat to static harmony that Rodin displays more melodramatically. Thus Kittler's comparison between the arch-backed ladies of Art nouveau and the *Grand Arc* of Jean-Martin Charcot's hysterical subjects catches a deeper relation than superficial formal resemblance.[25] Silverman also sees Rodin's figures as inspired by Charcot's study of the hysterical body.[26] The body out of control, the sick or decadent body, haunted the artists of the turn of the century, just as it did the scientists and politi-

cians. This body that violated traditional norms of beauty and health called for new modes of representation, both in the traditional arts (opening the way for the revolution of modern styles) and in the technological process of photographic representation.

Returning to the criticism of Rodin's monument we can discover another twist in the interlacings we are pursuing. The monument's official unveiling occurred as a part of the Festival of Unions of the Gymnastic Societies in Lorrain. The critics attacked Rodin's image of Claude as the embodiment of that which the Festival abhorred: the sickly, decadent body, declaring it, "the legacy of a generation deprived of gymnastics," an example of "unbalanced, sick art."[27] Such heightened anxiety focused on the degenerate or decadent body was partly a legacy of France's defeat in the Franco-Prussian war, and the gymnastic movement in France emerged largely as a means of reversing the physical weakness of the French recruit that many saw as an essential cause for that ignominy. As we know from the work of Marta Braun and Laurent Mannoni, Georges Demenÿ's desire to perfect, teach and promote a new system of gymnastics that could counter the decadent French body guided his work with Marey, while similar concerns motivated state funding of Marey's Physiological Station.[28]

If Marey's and Demenÿ's chronophotography can be seen as a direct response to the decadent body "deprived of gymnastics," as a means, among other things for devising a system of physical training and discipline for a new modern healthy and efficient body, other chronophotographers and pioneers in instantaneous photography focused more narrowly on observing and diagnosing the diseased and hysterical body. To fix the image of hysteria, Charcot instituted the *Iconographie photographique de la Salpêtrière* with photographs by Paul Régnard and later Albert Londe. As Silverman points out, Charcot was obsessed with visual representation.[29] Not only did the *Iconographie photographique de la Salpêtrière* record the many manifestations of disease, but much of Charcot's published work was devoted to claiming that traditional painting and sculpture portraying grotesque or supernatural scenes accurately portrayed the diseases he studied, especially hysteria.[30]

The lack of bodily control recorded in Charcot's images signified disease. Like Charcot, Londe believed in the alignment of vision and knowledge and sought to make his own apparatuses extend and supplement the power of human vision. The camera, Londe claimed, was the "true retina of the scientist."[31] Advocating a key role for photography in medicine Londe declared: "To determine the *facies* [the typical appearance] belonging to each disease, to each illness, to place it before the eyes of all, this is what photography is capable of."[32] As the modern disease par excellence, hysteria posed a challenge to representation. Taking over

the photographic service at the Salpêtrière in 1882, Londe immediately modernized the existing darkroom and studio and introduced the latest possibilities of instantaneous photography, stereoscopic photography and, using devices of his own invention, chronophotography.[33] The panoply of photographic methods Londe marshaled to record the effects of disease reveals an almost obsessive desire to document physical deviation through a exhaustive inventory of photographic technology: instantaneous images, images in relief and in the phases of motion. Photographic technology served as a means of rational defense against the lack of physical and mental control of hysteria, whose *facies* medical photography would wrest from its patients' deviant bodies and categorize scientifically.

Charcot's presentation of patients to students and visitors took on the form, as many have pointed out, of a private theater in which the power of the doctor's gaze as he both examined and hypnotized his hysterical female patients interacted with the visual attraction of their frequent seminudity. Charcot described himself to Freud as a "*visuel*," "a man who sees."[34] He claimed in one of his Tuesday lessons, "I am absolutely nothing but a photographer; I inscribe what I see."[35] But his role surpassed that of the passive observer, not only inscribing like a camera, but causing his subjects to freeze like an instantaneous photograph. In the spectacular display of hysterical symptoms that Charcot managed, the moment of cataleptic immobility played an important role, an effect that Charcot and his assistants could provoke at will by a variety of means. Richer and Charcot themselves drew the analogy: "The immobility of the attitudes thus provoked is eminently favorable to photographic reproduction."[36] In fact, as Ulrich Baer has shown, Charcot occasionally provoked an attack of hysterical catalepsy in his female patients by means of a sudden flash of brilliant electrical light within a darkened room, the very flash which made the photograph of their reactions possible. This cataleptic immobility was very strong and would even allow the doctor to arrange the patient's body into "an arch... so rigid it remains in this position for quite some time."[37] As Bauer says, "Catalepsy retains by way of the body what photography retains by way of the camera: it freeze-frames and retains the body in isolated position that can be viewed and theorized outside a sequence of motion."[38]

Charcot desired to represent the hysterical body in motion as well as catalepsy, and Londe sought technology for inscribing the succession of gestures or *attitudes passionnelles* in order to make Charcot's photograph-like perception available to all scientists. Thus Londe's chronophotographic devices captured successive phases of an hysterical attack, and recorded them in close chronological order. The still image arrested motion, mastered the out of control mobile body and thereby produced knowledge. Londe saw his role as photographer as the achieving of an

instant wherein science and knowledge triumphed over the vagaries and transience of the physical world. Whether capturing the stages of a *grand mal* seizure or the gait of someone moving down the stairs, (as in this Marey-like diagram taken from one of Londe's books on medical photography), instantaneous and chronophotography could reveal the actual order beneath physical phenomenon, invisible to normal human perception, the typical *facies* discernible through the plethora of physical symptoms.

Yet if we return to Duchamp's painting, or to the images of the Italian Futurists so often acknowledged as inspired by chronophotography, we glimpse more than the positivist confidence Londe displayed in the face of technology's encounter with the diseased body. These paintings don't simply plot the physical motion of the body onto a predictable, legible, mathematically ordered, space and time. Instead, both form and matter appear to be dissolved by motion, opening our vision onto a strange new world no longer corresponding to a simple conception of either the material or the ideal, but rather a liminal space in which matter breaks down into a sort of ethereal vibration and spiritual forces take on a quasi-material force. It is no surprise, as Marta Braun and Elizabeth Siegel have shown, that Anton Giulio Bragaglia, the father of Futurist photodynamism, related his photographic experiments to spiritualism and created his own version of spirit photographs.[39] A number of other spiritually or theosophically inspired painters such as the Czech Frantisek Kupka, saw in the specters of chronophotography icons of spiritual forces.[40] I am not attempting to supernaturalize the science of the turn of the century, but rather to point out that spiritualist imagery and metaphors seized upon the strangeness of new scientific images which seemed to contradict conventional understandings of the world. Precisely because they exceeded and confounded both the human eye and conventional human experience, new modes in the representation of motion served as metaphors of an other world, unfamiliar and inhuman.

Henri Bergson in his attempt to make the new awareness of motion at the turn of the century the basis of new models for human perception, denounced conventional ideas of motion as illusions which prevented a full understanding of human experience. Somewhat paradoxically, he described this traditional and distorted way the mind thinks of motion as a "cinematographical" illusion.[41] Picturing motion as a succession of static poses distorted the actual experience of transformation so central to Bergson's dynamic sense of experience. "In reality" Bergson claimed, (meaning in a reality not confined by our knowledge or practical habits of perception), "the body is changing form at every moment; or rather there is no form, since form is immobile and the reality is movement. What is real is the continual *change of* form: *form is only a snapshot*

view of a transition."[42] With this reference to the cinema, Bergson condemned a static conception of motion as the sum of a succession of still images, but Gilles Deleuze and others make it clear that Bergson was not taking an anti-modernist or anti-cinematic position.[43] In fact, Bergson's image recalls the unmoving strip of celluloid with its static frames side by side rather than the experience of a projected moving image. Describing the "cinematographical" character of the misleading mode of thought which sees movement as simply a quality added to entities, he imagines a film of a regiment of soldiers marching.[44] Bergson's cinematic example of a reified sense of motion is revealing. This image of the *défilement* of disciplined male bodies marching past the camera in cadence not only recalls the many actualities of military parades produced by the Lumières and other early filmmakers, but also one of the motives for Marey's research, the creation of a more physically perfect soldier.[45]

In a related essay, I have proposed the contrary to this image, also taken from early cinema and the mass entertainment from which it drew so many of its images, the serpentine dance created by Loïe Fuller.[46] In the films of these dances the body seems swallowed by a flux and reflux of motion, less solid matter than a materialization of energy and movement itself. Fuller, one of the inspirations of Art nouveau, created a perfect image for the interlacing and superimpositions of our diverse strands: motion itself as a spectacle, the body hidden, yet also revealed, transformed ethereally but also powerfully working its limbs and muscles (Fuller had to be carried to her dressing room after a performance, a sign, some felt, of her neurosis or hysteria, but more likely an indication of the enormous physical effort of manipulating yards of fabric). Fuller literally embodies the modern enigma of the representation of motion, its attempt to both define and transcend binaries of gender, material/ideal, knowledge and mystery.[47]

If, as the announcement of this conference asks, we stop reducing the revolution in our conception of time, motion, and representation that instantaneity and chronophotography offered at the turn of the last century to a simple narrative of technological progress and the "invention" of the cinema, we rediscover unresolved issues from the era of modernity, in which science, technology, mass entertainment and fine art rehearse a complex figure, exchanging roles and changing places, weaving a pattern of contamination and inspiration that perhaps will fall to the period of post-modernity to rework and renew.

NOTES

[1] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," *Illuminations: Essays and Reflections*, trans. Harry Zohn, ed. Hannah Arendt, New York, Schocken Books, 1969, p. 237.

[2] Besides the many traditional accounts of the origins of photography see Gregory Batchen, *Burning with Desire: The Conception of Photography*, Cambridge, MA, MIT Press, 1997.

[3] Cited in Batchen, *Burning with Desire..., op. cit.*, p. 34.

[4] Michel Frizot, "Speed of Photography: Movement and Duration," *A New History of Photography*, ed. Michel Frizot, Köln, Könemann Verlaggesellschaft, 1998, p. 243.

[5] Cited in Batchen, *Burning with Desire..., op. cit.*, p. 135.

[6] See Bernard Chardère ed., *Lumières sur Lumière*, Lyon, Presses Universitaires de Lyon, 1987, p. 67.

[7] Frizot, "Speed of Photography...," *op. cit.*, p. 241.

[8] *L'Amateur Photographe*, 15 February 1887, p. 41.

[9] *L'Amateur Photographe*, 1st February 1888, p. 63.

[10] Cited in Bernard Chardère, *Le roman des Lumière*, Paris, Gallimard, 1995, p. 301.

[11] Vincent Pinel, *Louis Lumière inventeur et cinéaste*, Paris, Nathan, 1994, p. 50.

[12] Pierre Cabanne, *Dialogues with Marcel Duchamp*, trans. Ron Padgett, New York, Viking Press, 1971, p. 30.

[13] Russell Ash, *Sir Edward Burne-Jones*, New York, Harry Abrams Inc., 1993, plate 19.

[14] Fernand Khnopff, "Memories of Burne-Jones," *Symbolist Art Theories: A Critical Anthology*, ed. Henri Dorra, Berkeley, University of California Press, 1994, p. 34.

[15] Cited in Ash, *Sir Edward Burne-Jones, op. cit.*, plate 19.

[16] See Sergei Eisenstein, *Cinématisme: peinture et cinéma*, ed. François Albera, Bruxelles, Editions Complexe, 1980.

[17] See the photographic studies reproduced in Michael Gibson, *Symbolism*, Köln, Taschen Verlag, 1999, p. 91.

[18] Émile Verhaeven, "Un peintre symboliste," in *Symbolist Art Theories..., op. cit.*, p. 62.

[19] Rodin, interview with Paul Gsell, in *Symbolist Art Theories..., op. cit.*, p. 79.

[20] Deborah L. Silverman, *Art Nouveau in Fin-de-siècle France: Politics, Psychology and Style*, Berkeley, University of California Press, 1989, p. 252.

[21] Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, p. 253.

[22] Cited in Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, p. 254.

[23] Cited in Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, p. 255.

[24] Cited in Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, p. 256.

[25] Friedrich A. Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz, Stanford, Stanford University Press, 1999, pp. 141-144.

[26] Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, pp. 252-253.

[27] Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, p. 253.

[28] Marta Braun, *Picturing Time: The Work of Étienne-Jules Marey (1830-1904)*, Chicago, University of Chicago Press, 1992, esp. pp. 68-73, and Laurent Mannoni, Marc de Ferrière le Vayer and Paul Demenÿ, *Georges Demenÿ. Pionnier du cinéma*, Paris/Douai/Lille, 1997: Cinémathèque française, Musée du cinéma – Editions Pagine – Université Lille 3, pp. 14, 111-117, 143-149.

[29] Silverman, *Art Nouveau in Fin-de-siècle France..., op. cit.*, pp. 91-106.

[30] See, for example, Jean-Martin Charcot and Paul Richer, *Les démoniaques dans l'art*, Paris, Delaye et Lecrosnier, 1887, Amsterdam, B. M. Israel, 1972.

[31] Cited in Georges Didi-Huberman, *L'invention de l'hystérie: Charcot et l'iconographie photographique de la Salpêtrière*, Paris, Macula, 1982, p. 35.

[32] Didi-Huberman, *L'invention de l'hystérie..., op. cit.*, p. 51.

[33] See Denis Bernard and André Gunthert, *L'instant rêvé : Albert Londe*, Nîmes-Laval, Jacqueline Chambon-Trois, 1993.

[34] Sigmund Freud, "Charcot," *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, trans. ed. James Strachey, vol. 3, p. 12.

[35] Jean-Martin Charcot, *Charcot the Clinician : The Tuesday Lessons*, trans., ed. Christopher Goetz, New York, Raven Press, 1987, p. 143.

[36] Cited in Sander Gilman, "The Image of the Hysteric," *Hysteria Beyond Freud*, Berkeley, University of California Press, 1993, p. 383.

[37] Ulrich Baer, "Photography and Hysteria : Towards a Poetics of the Flash," *The Yale Journal of Criticism* 7 (Spring 1994), p. 53.

[38] Baer, "Photography and Hysteria...," *op. cit.*, p. 53.

[39] Marta Braun, "Anton Giulio Bragaglia und die Fotografie des Unsichtbaren," *Fotografie des Unsichtbaren*, Ostfildern-Ruit, Verlag Cantz, 1997, pp. 109-120. Elizabeth Seigel's research paper in the Department of Art History, University of Chicago, "Tricks and Traces : Anton Giulio Bragaglia's Photodynamism and Photospiritism" first brought this aspect of his work to my attention.

[40] Jana and Medy Mládvých, *Frantisek Kupka*, Prague, Ceské Muzeum, 1996, n.p.

[41] Henri Bergson, *Creative Evolution*, trans. Arthur Mitchell reprint, edition Boston, University Press of America, 1983, pp. 305-306.

[42] Bergson, *Creative Evolution*, *op. cit.*, p. 302.

[43] Gilles Deleuze, *Cinema 1. The Movement Image*, trans. Hugh Tomlinson and Barbara Habberjam, Minneapolis, University of Minnesota Press, 1986, esp. pp. 1-12 and 56-70.

[44] Bergson, *Creative Evolution*, *op. cit.*, p. 305.

[45] See Braun, *Picturing Time...*, *op. cit.*, pp. 68-69.

[46] Tom Gunning, "Loïe Fuller and the Art of Motion," *La decima musa. Il cinema e le altre arti/The Tenth Muse. Cinema and other Arts*, ed. Leonardo Quaresima and Laura Vichi, Udine, Forum, 2001.

[47] The most complete and thoughtful treatment of Fuller is Giovanni Lista, *Loïe Fuller, danseuse de la Belle Époque*, Paris, Stock - Editions d'art Somogy, 1994.